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Dairy value chain in Tanzania: Background proposals for the CGIAR Research Program on Livestock and Fish

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Important note: Full information on references is included in the Program proposal that can be downloaded from http://cgspace.cgiar.org/handle/10568/3248

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Dairy value chain in Tanzania: Background proposals for the CGIAR Research Program on Livestock and Fish

The vast majority (about 80%) of Tanzania's 43 million people depend on agriculture, mainly mixed farming. Livestock contributes about 30% of agricultural GDP, mostly derived from over 18 million heads of mostly indigenous East African zebu cattle, the third largest in Africa after Ethiopia and Sudan. Improved dairy cattle comprise a relatively small number, 560,000. Cattle supply virtually all the milk though there is a small but steadily growing population of dairy goats mainly in Arusha-Kilimanjaro and Morogoro regions.

Milk supply has increased 130% over the last decade to about 1.6 billion litres (NBS 2009), implying a per-capita milk consumption/availability of approximately 39 litres per annum. Average producer prices have also fallen dramatically over the period from about USD 0.4 in 2000 in some areas to about USD 0.12 currently, implying a more stabilized market and better distribution. Arusha and Kilimanjaro regions supply about two-thirds of the milk. Other significant producing regions are Tanga, Mwanza, Kagera, and Dar es Salaam.

Demand has been rising sharply as projected a decade ago by MOAC/SUA/ILRI (1998), driven mainly by human population that is growing fast at 3.3% per annum and high economic growth rate of about 7% per annum over the last decade. The gap between demand and local supply is predicted to continue to widen in the medium term to 2020 (see projections below). The market continues to be dominated by raw liquid milk, which comprise over 95% of the marketed milk currently. Less than 1% of households consume processed milk according to a recent household budget survey (HBS) report (NBS 2007). Urban livestock farming is common in major cities, likely because of long distance from main production centres. The largest consumption centre, Dar es Salaam, is considered to have the largest number of dairy cattle kept within urban boundaries in East Africa, given the large gap previously observed in supply from outside the city and per-capita milk consumption among city residents (MOAC/SUA/ILRI 1998). The unmet demand in Tanzania presents important opportunity for improving the welfare of producers and their market agents, through income and employment generated in dairy production, processing and marketing.

Why this value chain?

Growth in the dairy industry has been ranked by ASARECA and IFPRI as the most important agricultural subsector in the ECA region in terms of potential GDP gains (Omamo et al. 2006). And there is large milk productivity gaps in each production system and genotype going by minimum and maximum production levels reported in the literature (Mwacharo et al. 2009). The potential for growth in the dairy sector in Tanzania may take similar trends with neighbouring Kenya where, with similar conditions, growth has been much faster and

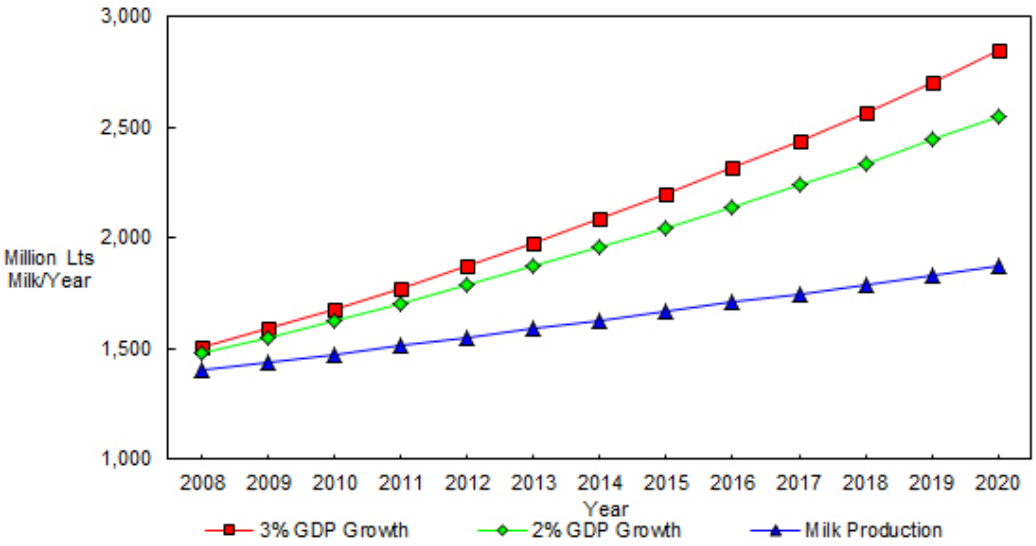
total production is now than six times Tanzania's production. The major difference lies in a longer history of public investment in improved genotypes and private sector led growth that has characterized dairying in Kenya. The rapid rise in demand and a liberalized economy now provide Tanzania with similar impetus for growth.

The dominance of small-scale production and marketing system in Tanzania is not only typical of dairy systems in East Africa but many parts of the developing world as well. However, dominant product types vary from mainly liquid milk in East Africa, to butter in Ethiopia, soft cheese in West Africa and milk sweets in India. The main constraints of limited feed availability and poor quality cut across dairy systems in all these regions. Lessons from dairy research and development in Tanzania can therefore be widely applicable.

Criteria and rationale for choosing Tanzania

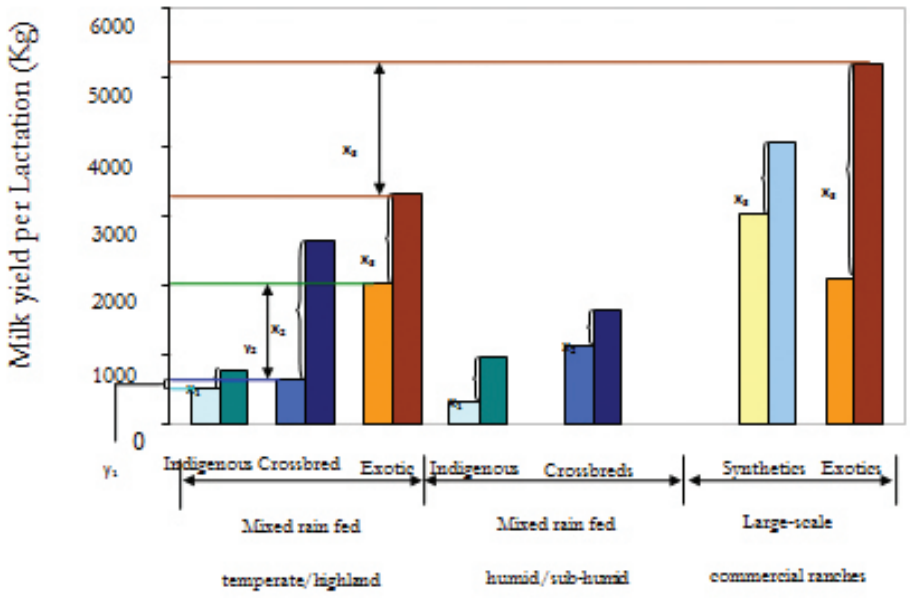
Criteria	Rationale for Tanzania
Growth and market opportunity	Demand for dairy products in Tanzania is driven by the large human population currently estimated at 43 million that is growing at 3.3% annually, urbanization at 5% annually and increasing income from high economic growth rate—annual real GDP growth is currently about 4% (NBS 2008). Milk supply has hardly kept pace with growth in demand. The momentum for growth was adversely affected in early 1990s when public support for both milk marketing and livestock services declined, leaving a wide gap. Private sector growth has been unable to fill this gap, even in the most productive regions, despite a flurry of activities by various actors, including small traders, private entrepreneurs, farmer groups and NGO's, each innovating mechanisms for collecting and retailing milk and for providing inputs and animal reproduction and health services. While the latest FAOSTAT indicates per-capita milk consumption in Tanzania has remained unchanged at about 24 litres over the past decade, national sources in Tanzania estimate that milk availability/ consumption has increased significantly to about 39 litres per capita annually (NBS 2007), up from 24 and 28 litres per capita estimated in 1998 by FAOSTAT and MOAC/SUA/ILRI, respectively. The source of the difference is in estimates of annual production.[1] Regardless of the different estimates, Tanzania still has very low average per-capita milk consumption levels compared to some neighbouring countries,[2] and well below levels seen among some segments of Tanzanian society, especially in urban areas. The rapid increase in the numbers of the more productive improved dairy cattle population, which is now estimated at about 560,000 heads (up from only about 240,000 heads a decade ago), indicates that production is already responding to meet the rising demand. Only an insignificant amount of some 25 million litres, less than 5% of production, is processed annually by private units, meaning the local milk supply is dominated by unprocessed milk. The most common processed milk product is fermented, locally known as mtindi and UHT, both comprising 77% of marketed processed milk products (NIRAS 2010). Consumption of packed milk is very low even in urban areas. The 2007 HBS estimates that less than 1% of households consume processed milk, with Dar es Salaam having the highest rate at 1.5%. Rising demand in urban areas has provided an incentive for imports to fill part of the small market for processed and packaged milk, mainly UHT, but figures on imports vary with various sources. Imports of dairy products in liquid milk equivalent between 2004 and 2009 averaged at 26,000 million litres per annum, growing 9.41%, and accounting for about 48% of the processed milk market (NIRAS 2010). Most imports comprise of UHT milk and cream, concentrated or sweetened. Major sources of imported dairy products are Kenya, South Africa and United Arab Emirates. Imports from within the region are likely to increase given the EAC Customs Union that now allows free trade without tariffs. The following Figure shows projections for local milk supply and demand in Tanzania to the year 2020, based on modest increases in real GDP growth. The demand projections are based on current consumption levels, projected for urbanization at 5% annually, population growth rate declining to 2.6% by 2020, an overall income elasticity of demand for dairy products generally of 0.8, and the indicated rates of real growth in GDP. Under the assumption of a modest 2% annual real GDP growth, milk consumption can be expected to rise by over 60% over 13 years to 2020, to reach nearly 2.5 billion litres annually. That rise would reflect an average per capita consumption level of still only about 56 litres annually in urban areas, and 37 litres in rural areas. Considering that income growth is a little faster than assumed, demand could easily rise more rapidly than these modest projections. For comparison, the Figure below also shows the projected rise in demand under 3% annual real GDP growth.

1. For example, in 2007, FAOStats and NBS estimated milk production in Tanzania at 953 million and 1.43 billion litres, respectively.
2. Per capita availability of milk in Kenya is currently estimated at over 100 kg annually



Projections in dairy supply and demand to 2020 for Tanzania	
Growth and market opportunity	Milk production trends were also projected and are illustrated in the Figure above. Production projections assume no change in per animal productivity or herd structure, and are based on extrapolating current herd changes. The traditional zebu herd is projected to increase at a rate of 1.4% annually and dairy herd, estimated to be growing at 5%. The latter growth rate is assumed to decline modestly to 4.6 by 2020. These projections suggest an increase of some 41% in milk production, with the dairy herd share rising from 34% to 43%. Under this supply projection and the demand scenario of 2% GDP growth, there could be shortfall of some 673 million litres of milk annually, or about 26% of demand. Under the same GDP scenario, an overall herd productivity increase of 4.5% annually would be necessary to enable supply to keep pace with demand. These projections suggest that, under current trends, production is very likely to fall short of demand. National economic performance continues to respond positively to recent structural reforms, implying the shortfall is likely to be substantial These trends present an important opportunity for improving the welfare of current and potential smallholder dairy producers in Tanzania and their market agents, through income and employment generated in dairy production, processing and marketing.
Pro-poor potential	Though successful economic liberalization and institutional reform in recent years have led to a recovery of the Tanzanian economy since 2000 with a high GDP growth, this has not impacted rural areas significantly and about 37% of rural Tanzanians are still classified poor and undernourished (NBS 2010). The 2008 World Bank Development Report cites evidence that investment in agriculture is critical to the process of ensuring a decline in poverty, and that the poor's involvement in markets offers pathways out of poverty at the household level. Dairying is widely considered to be one of the most promising agricultural pathways out of poverty, not only for producers but for consumers and the informal actors who dominate the marketing chain as well; hence the ranking of growth in the sector as the most important agricultural subsector in the region in terms of potential GDP gains in the medium term (Omamo et al. 2006). Small-scale dairy production and marketing benefits the poor in many ways, especially where increasing demand enhances those opportunities as in Tanzania. These include opportunities for intensification and enhanced productivity leading to livelihoods improvement, including through employment, besides nutrition benefits for the poor. It has been estimated that dairy farming generates about 50 full-time wage-labour opportunities per 1,000 litres of milk produced on a daily basis, and up to 20 full-time jobs (17 direct, 3 indirect) per 1,000 litres of milk handled on a daily basis by informal traders (Omore et al. 2004; SDP 2005). Milk-borne public health concerns that are usually the basis for discouraging the dominant informal milk markets that serve the poor. But these can be addressed without endangering the health of consumers (Omore et al. 2009). Evidence from neighbouring Kenya indicates that interventions to improve such markets accrue widespread and substantial benefits. Recent Impact analysis of an intervention to pro-actively engage small-scale milk traders through a training and certification quality assurance scheme demonstrated benefits to the Kenyan economy amounting to USD 33 million annually (Kaitibie et al. 2010). The benefits accrued mainly to producers through reduction in margins, but with milk traders and consumers benefitting as well.

Researchable supply constraints	The possibility of utilizing large areas of Tanzania's land mass that is suitable for livestock production is limited by tsetse infestation. Most marketed dairy production takes place in Arusha and Kilimanjaro, Tanga and Dar es Salaam Mwanza regions where there is relatively low disease challenge. The main constraint in production in these areas is the severe constraint posed by feed resources, including the high degree of seasonality (MOAC/SUA/ILRI 1998; Nkya et al. 2007). Limited quantity and quality of feed is considered to be the main reason for the low production of only 5–10 and 0.5 litres/day for lactating improved dairy and zebu cow, respectively. There is also a shortage of replacement start-up stock, especially in the Arusha-Kilimanjaro region where dairy is dominant. Linked to this may be the poor performance of AI and heifer breeding services. Heifer-in-trust schemes promoted by Heifer International and other agencies are playing a limited role in filling this gap among poor households. Most of Tanzania is lowland and humid implying most exotic breeds from temperate climates are not appropriate. But efforts at genetic improvements for adaptation to the tropical environment like the Mpwapwa were not adopted (Kyomo and Kifaro 2005). Whereas for some systems such as in the Arusha-Kilimanjaro highlands, it may be prudent to move from indigenous to crossbreeds and finally to exotic breeds and improved husbandry, in other more extensive areas, costs and benefits analysis may dictate that producers should upgrade their indigenous stocks to crossbred animals rather than to purebred exotic cattle. It might be worth casting the net wider to look at more productive tropical breeds found elsewhere like the Gir, a zebu breed, originally from India but now found in many places like Brazil where further improvements have occurred with milk yield averaging 3500 kg per lactation, about ten times the lactation yield of the East African Zebu. The Sahiwal is another dairy (and meat) breed that could be explored for multiplication and distribution because it is also well adapted to humid tropical conditions. Sahiwal cows average 2,270 kg of milk per lactation, while suckling a calf. While exploring options for improved cattle, niches for dairy goats should also not be overlooked. Dairy goats have for a long time been seen by stakeholders in Tanzania as offering increased dairy productivity in areas of intensive land use and for resource-poor households, but little is known about their performance and viability in Tanzanian production systems. Presently various breeds including Saanen, Toggenburg, Anglo-Nubian, Alpine and their crosses are being actively promoted by various dairy development projects such as HPI, Farm Africa and various church groups. Anecdotal information is that there is high demand and many households seeking dairy goats do so because they want to replace the cow milk they consume at home and to sell their offspring. Others see dairy goats as a suitable low-cost and low-risk alternative to cattle dairy production for resource-poor households in areas of intensive land use, particularly where access to feed resources is limited. While other more productive genotypes adapted to the tropical environment is being explored, the potential for productivity gains from existing breeds should not be ignored. This potential is considered to be substantial in all production systems, especially for improved dairy cattle. Both the Figure and the Table below present percentage differences based on various literature sources in East Africa (including Tanzania) of maximum and minimum production levels within and between both genotypes and animal husbandry.



Differences in milk production by different genotypes in dairy cattle production systems found in different regions of East Africa. Source: Mwacharo et al. (2009).

Key for both Figure above and Table below):
Light coloured bars = Minimum production; Dark coloured bars = Maximum production
xi = Yield gaps due to 'animal husbandry practices'
yi = Gap in productivity due to 'genotype'
z = Gap in productivity due to 'differences in the production system'

Per cent (%) differences in maximum and minimum milk production levels within and between genotypes representing the yield gaps due to animal husbandry and genotype in East Africa

Differences (%) in productivity due to animal husbandry			Differences (%) in productivity due to genotype		
Indigenous breeds	Crossbreeds	Exotics	Indigenous vs. crossbreeds	Indigenous vs. exotic	Crossbreeds vs. exotic
32.7 (X1)	75.8 (X2)	38.9 (X3)	17.9 (Y1)	73.9 (Y2)	68.2 (Y3)

Source: Mwacharo et al. (2009).

The under-exploited genetic potential is mainly attributed to limiting feed resources, which if addressed could triple milk yields in crossbred genotypes (see the above Figure). For example, Brachiaria grasses improved by CIAT have shown both high biomass production, good nutritional quality, and increased drought resistance. Dual purpose legumes like cowpea are not widely used, and the current application of feed conservation technologies is very limited. Furthermore, the large potential for existing zebu cattle population with potential for increased milk offtake has not been adequately explored. Information is needed on biophysical and market factors, dairy technology adoption patterns, herd structures and dynamics, socio-cultural factors and relative economic advantages/competitiveness of various levels of dairy intensification. The epidemiological picture is unclear though important disease challenge is reported in many areas, contributing to milk deficits in some areas where human populations are high. Experience with vaccination against East Coast fever in northern Tanzania indicates that technological solutions can result in dramatic reductions in disease incidence. The vaccine hitherto considered undeliverable in pastoral communities due to poor infrastructure has been successfully delivered and has reduced mortality from 30-50% to only 2% in over 100,000 vaccinated calves in the area. However, the extent to which private sector solutions can address these constraints is unclear.

As shown above, demand and supply projections suggest excellent opportunities exist for significant growth in smallholder dairying. But the structure of milk marketing and the dominant raw milk market underpins the nature of constraints faced in the marketing chain. Beyond quality and market access improvements, it is unclear what specific interventions are needed to grow the formal sector given that capacity utilization of current processing capacity of about 350,100 litres per day below 25% (RLDC 2009; NIRAS 2010). The continued dominance of the informal milk market in spite of several decades of policies and investments efforts to promote pasteurized milk marketing and consumption is linked fundamentally to the strong preference by consumers for fresh milk. Given that milk processors cannot generally compete on a cost basis with the raw milk market, if new dairy development efforts are to be viable in the long-run, they must explore the possibilities of working through market mechanisms which provide consumers with their preferred product at the lowest cost. The challenge is to address quality and safety challenges in the process. Expanding examples of commercialized supply of training and certification through accredited business development service providers that has been successfully tested as a mechanism for addressing food quality and safety concerns and differentiating the milk sold is one option for promoting market access is one option for promoting the long-terms interests of smallholder farmers, market agents and consumers. Additional information is required to better understand viability of alternative market channels, especially in relation to market margins and cost structure, barriers to entry, including credit, competition from imports, and role of transaction costs in determining farmer participation in markets.

The role of dairy farmer groups is seen in Tanzania to be very small, yet experience elsewhere has shown that they may be critical to assisting the sustained participation of smallholder producers, by providing both milk market outlets and access to services. Expansion of their role is likely to be necessary for continued dairy development. There is uncertainty as to the gaps in delivery of services (input supply, credit and extension services) that can be filled by the private sector, and the impact this is having on growth of dairying by smallholders. Slow changes in land tenure policy reform is also seen to as a constraint to access to credit and long-term investment, but is not specifically a dairy or livestock issue.

The main challenge for both research and development will be how to identify and alleviate these technological constraints to upgrading and expanding the dairy value chains.

Enabling environment	The policy direction is to increase consumption of milk supplied from local sources. Recent investment in institutional development, such as the Dairy Policy and Act and subsequent formation of the Tanzania Dairy Board, is beginning to provide a conducive environment for broader dairy rector regulation and development. The Board, formed in 2006, provides a platform for stakeholder engagement and active participation in dairy sector development. Key stakeholder associations that participate in the Board are: Tanzania Milk Processors Association (TAMPA) and Tanzania Milk Producers Association (TAMPRODA). After its formation, TDB took over coordination of consumer education to promote milk consumption and dairying that include publicity campaigns held annually around the country during the June Milk Week, among other activities. Several bilateral and multi-lateral donors and NGOs are currently engaged in dairy development in Tanzania. The recently launched Eastern Africa Agricultural Productivity Project (EAAPP), a regional project funded by the IDA to nurture centres of excellence that has dairy as one of the commodities targeted for improvement within collaborative arrangements and partnerships spanning four countries in the region, namely Tanzania, Ethiopia, Kenya and Uganda and involving ASARECA in communication and some coordination. Tanzania and Norway are committed to participate in the development and implementation of the REDD (Reduced Emissions from Deforestations and Forest Degradation) initiatives in Tanzania to combat deforestation and the challenges of climate change. Livestock offers the main opportunity for improving livelihoods in extensive areas where productivity losses associated with climate change risks are high.
Existing momentum	ILRI has been involved in several past dairy research projects in Tanzania. Over the last one and a half decades, ILRI has worked with dairy research and development institutions to appraise the dairy sector (MOAC/SUA/ILRI 1998). This was shortly thereafter followed by research into market mechanisms, efficiency, processing and public health risks in peri-urban dairy product markets (Omore et al. 2009). ILRI was also invited severally over the period to stakeholder policy consultations that led to the formulation of the current Dairy Industry Act in 2004. Currently, the Tanzania Dairy Board (TDB) assisted by a local NGO, the Austroproject Association, is piloting a commercialized supply of training and certification milk quality assurance scheme with support from ASARECA and ILRI. CIAT has also been engaged recently initiated steps to build up expertise on tropical forage research in the region, and Tanzania is among the target countries. On-going donor investments targeted at dairy development include those implemented by Heifer Project International (HPI) and Farm Africa that have been involved in promoting access by poor households to improved dairy cattle and goats, respectively, for over a decade. Others include: SNV (capacity building); SDC (milk market promotion and support to Rural Livelihood Development Company); and, BRAC (AI services, http://www.brac.net/content/about-brac-tanzania). The United Nations, through UNDP and FAO, are also reported to be engaged in promotion of value chains approach to the development of various agricultural commodity systems. Locations of Tanzania have also been recently identified by AGRA as 'breadbaskets' among other locations in various countries in Africa. Planned engagements include The Royal Norwegian Embassy (RNE) and SUA who are planning to have dairy value chain and policy research included in the next phase of its new four-year-period program that will put emphasis on scaling-up and dissemination of best practises from previous programs in a value-chain-perspective and actively collaborate with public and private sectors as well as non-governmental organizations in the process his will be the successor project to the just ended Program for Agricultural and Natural Resources Transformation for Improved Livelihood (PANTIL). The on-going East Africa Dairy Development Project (EADD) in Kenya, Uganda and Rwanda by consortia including HPI and ILRI, is considering including Tanzania in its next phase anticipated in 2012.

Research and supporting actions

Recognizing that further discussion will be needed to refine these, indicative actions are described in the following Table.

Indicative research areas and supporting actions in Tanzania value chain

Research area	Supporting action
1. Increasing productivity of existing dairy systems	
Identify adoptable strategies to alleviate under-nutrition of dairy animals and reduce the seasonal variation in feed availability Investigating existing constraints and options for breeding strategies (new genotype, AI, bull services etc.) Evaluate constraints and potential to dairy goat dissemination including evaluation of determinants of adoption and economic viability, including areas having both dairy goats and cattle; analysis of alternative multiplication/breeding schemes, based on extensive project experience in dairy goat dissemination; and, evaluation of resource use efficiency in comparison to cattle and local goats. Update existing information on viability of alternative milk marketing mechanisms and optimal mix between informal and formal marketing systems. This includes identifying reasons for low capacity utilization of existing chilling/processing plants	Promote dairy farmer group development with emphasis on milk collection, and provision of feeds and reproductive and health services. Farmer groups may have an advantage over both informal milk traders and private processors in that, while offering farmers reliable milk outlets, they are well placed to simultaneously provide inputs and services such as AI. Federation of individual farmer groups to provide economies of scale in distribution and service and input provision. If/when a genuine federation of groups is attained, processing of milk by that federation could be considered. Promote milk distribution outlets in urban areas through simple bulk channels, including kiosks, dairy bars etc. This could be linked to either private entrepreneurs or federations of farmer groups but informed by research into which market channels will be viable in the longer run. Establish a platform for the co-ordination of dairy development. Many institutes perform their roles in isolation, whether in research, in dairy development, or in dairy marketing. The Tanzania Dairy Board may be one avenue and a convener Pro-active engagement to empower small-scale traders to acquire skills in milk quality control and entrepreneurship Enhance on-going efforts towards consumer education regarding milk quality, hygiene and consumption, particularly in urban areas. Through their demands and preferences expressed as choice of purchases, consumers are best-placed to induce better quality control in informal markets and the development of the formal market.
2. Increasing marketed offtake and dairy herd expansion in extensive systems	
Identification of relatively extensive production regions with potential for increased milk offtake, and identification of the conditions necessary for exploiting that potential This includes: a) an *ex ante* analysis of dairy potential in terms of agro-ecological, spatial, and market factors, disease challenge, distance, infrastructure, and collection system development on dairy potential, b) an *ex post* analysis of dairy technology potential including analysis of adoption patterns of components of dairy technology packages Update existing information on milk demand patterns and seasonality including product differentiation, and secondary urban markets. Impact assessment of the contribution of dairy system development to households particularly the poor. This includes: a) intra-household impact assessment, dealing particularly with child nutrition, and the gender implications of market-oriented dairying, and b) direct and indirect economic impact assessment including linkages of the dairy sector to the rest of agricultural and non-agricultural sectors.	Given the relatively small exotic dairy herd population, priority for milk market development should be given to increasing the offtake from existing traditional herds, or importing and promoting more productive tropical breeds that can withstand tropical conditions (e.g. the Gir or Sahiwal). As farmers become better equipped to deal with the disease challenge, cross-breeding of existing cattle should be encouraged. Expand heifer and dairy goat loans schemes to smallholders, perhaps through establishment of multiplication schemes. Promote the provision of AI services by private livestock service providers and smallholder farmer organizations that currently do not provide the service. Appropriate training is required to improve farmer acceptance of technicians and AI.

Gender dimensions

Successive surveys of gender participation in dairy production and marketing in eastern Africa has repeatedly shown that women control significant proportion of the income derived from dairy production, even though men may own the production assets. But direct participation by women in marketing declines relative to that of men as marketed output increases and the milk is sold to large bulking points, such as dairy cooperatives. Women are more likely to receive money from milk sold to individual customers and private traders than from dairy cooperatives. Therefore, women producers would be expected to benefit from promotion of small-scale milk marketing.

Opportunities and constraints in dairy value chain in Tanzania and the research and development actions to overcome them

Value chain components	Developmental challenge	Researchable issues and supporting actions	Indicative partners	Outcomes
Inputs and services	Key developmental challenges Suboptimal inputs and services needed to exploit genetic potential of existing dairy herds Constraints to feed production and marketing Optimal strategies for delivery of animal health services	Researchable issues Identify viable collective action and/or private sector solutions to provision of inputs and services Supporting actions Promote dairy farmer group development	Research SUA, GoT, ILRI, CIAT Supporting actions GOT, Various national and international NGOs	Enhanced use of inputs and services Increased productivity (reduced morbidity and mortality)
Production	Key developmental challenges Under-nutrition of dairy animals seasonal variation in feed availability Low marketed dairy production and offtake in extensive systems	Researchable issues Identify adoptable strategies to alleviate under-nutrition Introduce other tropical dairy breeds (e.g. Gir and Sahiwal) Supporting actions Promote dairy farmer group development	Research SUA, GoT, CIAT ILRI Supporting actions GOT, Various national and international NGOs	Increased productivity in intensive systems and increased milk offtake in extensive systems
Transport and processing	Key developmental challenges Poor infrastructure, the development of which can greatly ease milk collection and marketing Under-utilized capacity for existing chilling/processing plants Under developed business service provision	Researchable issues Supporting actions Infrastructure development to ease milk collection and marketing Promote dairy farmer group development Maximize utilization of existing chilling/processing capacity	Research SUA, GoT, ILRI, CIAT Supporting actions GOT, TDB, Processors, Various national and international NGOs	Increased marketed milk offtake from all systems

Value chain components	Developmental challenge	Researchable issues and supporting actions	Indicative partners	Outcomes
Marketing	Key developmental challenges Near-absence dairy farmer groups with emphasis on milk collection, and provision of feeds and reproductive and health services. Transformation of informal milk markets towards formality	Researchable issues Determine viability of alternative milk marketing mechanisms and optimal mix between informal and formal marketing systems. Supporting actions Pro-active engagement to empower small-scale traders to acquire skills in milk quality control and entrepreneurship	Research SUA, GoT, ILRI, CIAT Supporting actions GOT, TDB, Processors, Various national and international NGOs	Increased proportion of formally marketed milk
Crosscutting issues	Key developmental challenges Low direct participation by women in marketing relative to that of men as marketed output increases	Researchable issues Understanding reasons behind gaps in achieving gender equity Supporting actions Gender mainstreaming	Research SUA, GoT, ILRI, CIAT Supporting actions GOT, various national and international NGOs	Improved gender equity

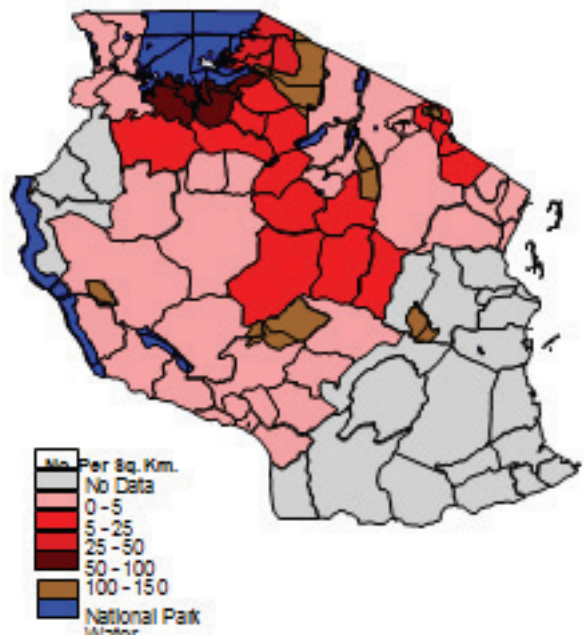
Geographic focus

For increasing productivity in existing dairy systems

Priority area to focus activities directed at increasing productivity in existing dairy systems are as follows, in order of priority given the current density of improved dairy cattle: Northern highlands (Arusha, Kilimanjaro), Southern highlands (Mbeya, Iringa), Coast (Tanga), and Lake Zone (Kagera). Although with increasing numbers of dairy cattle, dairying in Dar es Salaam is considered low priority because it is unlikely to be a primary source of livelihood for those involved.

For increasing marketed offtake and herd expansion

Extensive areas with the highest density cattle are Lake Zone (Mwanza, Mara), Central Tanzania (Dodoma, Singida) and per-urban Dar es Salaam. Previous and on-going efforts to increase marketed offtake from these areas by, *inter-alia*, Austro-project and RLDC, respectively, need to be reviewed before new initiatives are taken.



Map of cattle density in Tanzania (all breeds)

Potential for impact

The main strategy for translating the dairy value chain development activities and outputs towards outcomes and impacts for the poor is to by, first, channelling the research directly into improving value chains with development partners, and second, on working with the private sector, at all levels (e.g. service providers for feed, AI, health and processors). Serving as knowledge partner for development partners implementing large-scale interventions comprising new integrated services, provides direct access to immediate promotion/scaling out and uptake of best-bet strategies and technology packages. Playing an active role in M&E also provides an avenue for learning and feedback. Impacts are envisaged through increased per-capita milk consumption by over 60% in 2020 if the target of overall herd productivity increase of 4.5% annually is attained. Impacts on livelihoods can be extrapolated from the on-going East Africa Dairy Development Project (EADD) where

a doubling of income for 179,000 households is envisaged and is on track to being achieved over a 10 year period. Potential impacts may also be extrapolated from the study by Kaitibie et al. (2010) where one policy intervention generated benefits to the Kenyan economy amounting to USD 33 million annually.

Summary of indicators along the impact pathway that we believe can achieve these impacts.

Intermediate outcome

- 10 identified VC constraints resolved or lessened
- % increase in identified value chain effectivness metrics

Ultimate outcome

- At least 50% increase in dairy annual production for target markets by 2020.
- 100% increase in households participating in value chain

Impacts

- Average per capita dairy consumption in target region increases towards recommended levels by 60%
- 90,000 households double their dairy income by 2020

Components	Value chain outcomes
Inputs and services	Increased private sector participation in inputs and services provision
	Increased number of farmer groups engaged in provision of inputs an services
	Increased access to desired inputs and services for breeding, feed, and animal health
	Improved feed quality and increased quantity of feed (forage and concentrates)
	Increased access to affordable animal health care
Production	Reduced seasonality in milk supply
	Increased milk offtake from existing herds in extensive areas
	Increased feed options available
	New more adaptable breeds introduced and accessible
	Reduced yield gap for cows with under-exploited genetic potential
	Reduced disease risk and mortality, especially ECF
Transport and processing	Increased volume and proportion of processed milk
	Increased number of small-scale milk traders selling more milk
	Reduced transport and transaction costs
Marketing	Increased number of farmer groups engaged in milk marketing
	Reduced transactions costs
	Participating milk business enjoying price premiums from improved milk quality
	Higher milk volumes sold to more and profitable outlets
	More women participating in larger milk businesses and farmer organizations

Full information on references is included in the Program proposal that can be downloaded from http://cgspace.cgiar.org/handle/10568/3248